

Intelligent Transport Systems: What Have We Learned?

A U.S. Perspective

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Overview

- **ITS Services**
 - **Successful applications**
 - **Not successful applications**
 - **“The jury is still out”**
- **Cross-cutting program areas**
 - **Technologies, Architecture, Standards, Institutional, Deployment Programs, Market forces**
- **What does the future hold?**
- **What next steps are needed?**

Summary

- **Three critical dimensions:**
 - **Technology**
 - **Systems**
 - **Institutions**
- **Technologies: the issues are primarily cost and ease of use**
 - **Sensing**
 - **Communicating**
 - **Computing**
 - **Hardware**
 - **Algorithms - only technology area with functional issues**

Summary

- **Systems: the issue is integration.**
- **Institutions: The major issues fall into this category.**
 - **Intra-jurisdictional questions**
 - **Regional perspectives**
 - **Funding budgets for operations**
 - **Institutionalized operations/ITS**
 - **System integration**
 - **Training and retaining qualified staff**

Arterial Management

- **Successes**
 - Coordinated signal control systems with tactical traffic actuation
 - Priority control for transit and emergency vehicles (limited deployment)
- **“The Jury is Still Out”**
 - Truly adaptive signal control has not made much progress in the field
 - U.S. initiative just beginning operational testing stage
 - A few implementations in U.S.A. using SCOOT or SCATS
 - No “best practices” or guidance on what works when
 - Display of information to travelers on arterials

Freeway Management

- **Successes**
 - **Ramp Metering**
 - **Definite benefits on mainline (more control over flow build-ups)**
 - **More research required for effects on ramps and adjacent facilities**
 - **Information Display (audio/visual)**
 - **Particularly when information is timely and provided in advance of diversion points**
- **“The Jury is Still Out”**
 - **Dynamic control signs**
 - **Lane and speed control is effective in Europe**
 - **Field tests in US required**

Incident and Emergency Management

- **Successes**
 - **Service Patrols and Incident Management Programs are big winners**
 - **Improve capability to manage incidents**
 - **Assist in reducing delay, improving traveler safety**
 - **Surveillance**
 - **Reports from travelers with cell phones are typically much faster than sensor-based detection algorithms**
 - **Video/CCTV effective in reducing verification time**
 - **Urban freeway deployments proceeding, arterials starting**
- **Integration between agencies still could be improved**
 - **freeway, emergency, police, arterial, transit**

Electronic Payment

- **Successes**

- **Electronic Toll Collection (big winner)**

- Widespread deployment, systems are being installed at a fast pace, win-win benefits
 - Regional tag compatibility fairly good, but back-office processing needs improvement

- **Electronic Fare Payment (limited deployment)**

- Not as far along as ETC, but catching on slowly
 - Technology is available, but implementation has been slow
 - Need to integrate with other services (ATM, credit cards, etc)

Transit Management

- **Successes**
 - Automated Vehicle Location/CAD systems are becoming widely deployed
 - Improved reliability of service, better visibility for operators, security is enhanced
- **Not Successful**
 - Dynamic rideshare programs
 - Dependence on other drivers to participate - service perceived as unreliable
 - Privacy concerns
 - Only work if self-organized (e.g., D.C. SLUG-line)
- **“The Jury is Still Out”**
 - Does better information increase ridership?

Multimodal Traveler Information Systems

- **Successes**
 - Pre-trip, free services using the Internet
 - Niche markets for traveler services and static navigation
- **Not successful**
 - Traveler information kiosks (except for niches)
- **The jury is still out**
 - In-vehicle equipment such as dynamic route guidance
 - Fee-based services
 - ISP market
 - Public agency subsidy still seems to be needed
 - Are customers willing to pay?
 - Can advertising generate enough revenue?
 - Can new services generate more perceived value?
 - Surveillance still limited, limiting real-time information

Rural ITS

- **Most services still in operational testing stage - deployment is very limited**
- **Promising Areas**
 - **Mayday/ACN**
 - **Spot hazard warnings**
 - **Coordinated rural transit**
 - **Rural/statewide/national traveler information**
 - **Road weather sensing and prediction**
 - **Rural fleet management**
 - **Extended-area traffic management**

Commercial Vehicle Operations

- **Successes**
 - **Fleet management/tracking systems: widespread deployment**
 - **Safety Sells**
 - **Manufacturers beginning to offer safety-enhancing system (lane-tracking devices and improved brake systems)**
 - **Beginning limited deployment**
 - **Weight screening (Weigh-in-Motion) systems**
 - **Credentials administration (limited deployment): facilitated by states acceptance of Internet interfaces**
- **“The jury is still out”**
 - **Electronic screening/pre-clearance systems**

Other Trends

- **Enforcement**

- Growing acceptance of using ITS for *some* enforcement
- Simple and effective
- Limited deployment, but *large* benefits where deployed

- **Archiving Data**

- Early stages of deployment (esp. integrated archive systems)
- Concepts still being tested; researchers beginning to employ
- High potential for reducing data collection costs associated with field trials, evaluations
- In some cases, may eliminate need to conduct field study (realistic “yoked-driver” studies can be simulated)
- High potential for improved operational and long-range planning

Cross-Cutting Areas: Technologies

- **Communications media**
 - **Successes**
 - Internet
 - Short-range communications (DSRC) for toll-tags
 - GPS for location determination
 - Fiber (many technologies support fixed point-to-point communications)
 - Digital Subscriber Line (DSL) technologies (emerging)
 - **Not successful (for ITS)**
 - 220 MHz channels
 - FM Subcarrier
 - Cellular digital packet data (CDPD) for travelers

Cross-Cutting Areas: Technologies

- Emerging media
 - Wireless Internet
 - Local area wireless (Bluetooth)
 - High speed wireless
- Surveillance
 - many sensor-based products exist, but loops still dominate
 - video and machine vision have grown in use
 - toll tags for probe have been successful in some areas
 - use of cell phones for providing probe data did not work well (CAPITAL Ops. Test)
 - Jury out: FCC requirement for location information may change this

Other Cross-Cutting Areas

- **Architecture**

- Has been a key tool for promoting institutional integration
- Number of efforts currently underway to develop regional architectures
- U.S. “experiment” now being followed as a model in many other countries
- Need to ensure cost-effective means of updating

- **Standards**

- Federal support has accelerated development of needed standards
- NTCIP and in-vehicle data bus are both examples of successful standards development efforts
- Federal support may have generated too many efforts where critical need and client pull missing

Other Cross-Cutting Areas

- **Institutional**
 - Often more difficult to resolve than technical issues
 - Make or break a successful, integrated ITS deployment
- **Deployment Programs**
 - Ability to re-program funds among various local projects increases the chance that a recipient will succeed
 - May imply benefit to larger, multi-faceted deployment projects
- **Transportation Planning**
 - Traditional analysis cannot capture benefits of more efficient operations (including ITS impacts)
 - Research has identified new modeling methods to capture these benefits

Other Cross-Cutting Areas

- **ITS Market Drivers/Lessons learned**
 - Increasing safety has emerged as the big seller for ITS
 - ATMS is still the big market
 - Consumers appear more willing to listen to advertising than pay for a service
 - Net profitability is slow to develop due to vendor investment to boost consumer awareness
 - Vendors focusing on capturing market share
 - Mixed results for private toll roads (SR91 and Dulles Greenway vs. Toronto 407)
- **We have experienced a slower than predicted market growth (both public and private)**

What Does the Future Hold?

- **More integration of services and components**
- **Continued technology developments and competing standards**
- **Service developments**
 - **Archiving of ITS data will lower costs of evaluation and performance monitoring**
 - **Coalescence of national traveler info**
 - **ITS for roadway maintenance added as new user service**
 - **Next-generation road weather**
 - **Expanded sensing/warning on rural roads**
 - **Statewide traffic and emergency services management**
 - **Packaged rural APTS/HHS coordination**
 - **Vehicle-based safety systems**

What Next Steps are Needed?

- **Encourage deployment of surveillance**
 - **Key contributor to arterial and freeway management as well as ATIS**
 - **Incentives, promotion, consider establishing minimum requirements for National Highway System**
 - **Promote tags as probes where appropriate**
- **Research into performance of real-time adaptive signal control approaches: what works, how well, and under what conditions?**
- **Further R&D/field testing of efficient integrated para-transit**
- **Continue Commercial Vehicle Information and Safety Network (CVISN) roll out**
- **R&D, testing, and promotion of non-urban ATIS/ATMS, road weather**

What Next Steps are Needed?

- **Continued support for limited set of key standards**
 - **Standards maintenance, updates, and revisions**
 - **Track deployment of standards-based traffic management and center-roadside products**
 - **React quickly if products not being developed**
 - **React quickly if problems with standards**
- **Fill in evaluation voids**
 - **Integration**
 - **Rural**
 - **Traveler information**
 - **Management of transit maintenance**
- **Continued tracking of new technology impacts and trends across program**